

# PRANAV MINASANDRA

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## Interests

I am generally interested in animal movement and collective behaviour, and the implications they have on other biological processes. I enjoy problems that demand solutions that use combinations of *computational*, *data-driven*, and *theoretical* methods.

## Education

### Max Planck Institute for Animal Behaviour, Konstanz, Germany

PhD as a member of the International Max Planck Research School (IMPRS) of Organismal Biology with a DAAD-GSSP scholarship.

2020  
onwards

### Indian Institute of Science (IISc), Bengaluru, India

1-year Master of Science in Biology  
+ 4-year Bachelor of Science (Research) with a major in Biology  
Current CGPA - **6.3** / 8.0

2015 -  
2019 -  
2020

## Publications

Minasandra, P., & Isvaran, K. (2020). Truncated power-law distribution of group sizes in antelope. *Behaviour*

## Research experience

### Behaviour state dynamics using accelerometry and Machine Learning

Supervised by Dr Ariana Strandburg-Peshkin<sup>1</sup>

Studied behavioural state dynamics using Spotted Hyena (*Crocuta crocuta*) accelerometry data and Developed a classifier for recognising behavioural states using accelerometer data in Hyenas.

2019 May-  
Now

### Vegetation impermeability and animal movement

Supervised by Dr Maria Thaker<sup>2</sup>

Used computational (agent-based) methods and field observations to investigate the effects of impermeable vegetation on animal movement strategies; and the effects of such movement on vegetation patterns.

2018 Feb-  
2019 Apr

### Risk-Reward strategies of animals in a fragmented habitat.

Supervised by Dr Kavita Isvaran<sup>2</sup>

Modelled habitat use patterns and their effects on populations of animals in a habitat fragmented by human intervention. This was done using difference equation modelling. Currently mentoring an undergraduate student who is taking this project forward.

2018 Aug-  
Now

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<sup>1</sup>Department of Biology, University of Konstanz

<sup>2</sup>Centre for Ecological Sciences, Indian Institute of Science

**Group size distributions in an antelope**Supervised by Dr Kavita Isvaran<sup>2</sup>.Used mathematical and statistical techniques to determine the best possible distribution function to describe group sizes of Blackbuck *Antilope cervicapra*.2017 Mar-  
2017 Aug**Relevant  
courses****Graduate level**

Stochastic and Spatial Dynamics in Biology; Game Theory and Mechanism Design; Pattern Recognition and Neural Networks; Theoretical Ecology; Advanced Ecological Statistics; Quantitative Ecology; Animal Behaviour; Plant-Animal Interactions; Ecology: Principles and Applications; Technical writing and presentation; and Research Communication.

**Undergraduate level**

Experiments in Ecology and microbiology; Analysis and Linear Algebra (I and II); Probability and Statistics; Introduction to Scientific Computing; and Algorithms and Programming;

**Fellowships****Deutscher Akademischer Austauschdienst - Graduate Student Scholarship Programme (DAAD-GSSP)**

Nominated by the IMPRS for Organismal Biology based on an evaluation of a proposal; followed by an interview.

2020 Oct  
onwards**Kishore Vaigyanik Protsahan Yojana***All India Rank : 135*

Includes stipend and contingency

2015-  
2020**Teaching****Teaching Assistantship**For the course *Quantitative Ecology: Research Design and Inference*  
Conducted several classes, graded assignments, managed course website.2019 Aug -  
Dec**Mentored undergraduate student**

Mentored and guided Ananya Passi in a mathematical modelling project focussing on habitat use and population dynamics.

2019 May-  
Now**Schools  
Conferences  
Seminars****Simons - NCBS *Physics of Life* Monsoon School**An undergraduate and graduate level school on mathematical biology, by researchers from across India in the relevant fields. *One among 37 students selected from across India.*

2017 Jun

**GubbiLabs *Mapping Essentials* 2018**

An intense training programme on open source mapping

2018 Apr

**Technical  
skills***Programming languages*Python; R; Linux scripting using Bash; L<sup>A</sup>T<sub>E</sub>X; Matlab; C*Mathematical modelling*

Models incorporating spatial and stochastic variables; Non-linear dynamics, including population dynamics and evolutionary dynamics; Probability models; Numerical simulations of all the above.

*Spatial analysis*

Familiar with simulating spatially explicit PDEs; Familiarity with qGIS; Efficient use of Google Earth

*Statistics*

Strong background with probability theory; Distribution fitting; Heavy-tailed distribution fitting; Quantitative analysis of movement; GLMs; Linear Models; Basic statistical techniques

*Computational skills*

Parallel processing in Python using `multiprocessing`; Methods in machine learning; Front-end development in R `Shiny`; Agent based models; data visualisation using `matplotlib`; Data Analysis and visualisation in R; familiarity with a wide range of python libraries; methods in Scientific Computing.

*Miscellanea*

Technical writing

**Services**

Developed R ShinyApp for an age-structured COVID-19 compartmental model for Indian states, [for outreach](#).

Convener, Naturalists - the IISc UG Biology Club

Initiated a semester-long lecture series called [Umwelten](#)

Founded the UG Theoretical Biology Circle at IISc

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**References**

**Dr Ariana Strandburg-Peshkin,**

Department of Biology, University of Konstanz, Germany

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**Dr Kavita Isvaran,**

Centre for Ecological Sciences, Indian Institute of Science, Bengaluru, India

Contact: [kavita@iisc.ac.in](mailto:kavita@iisc.ac.in)

**Dr Maria Thaker,**

Centre for Ecological Sciences, Indian Institute of Science, Bengaluru, India

Contact: [mthaker@iisc.ac.in](mailto:mthaker@iisc.ac.in)

**Dr Vishwesh Guttal,**

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